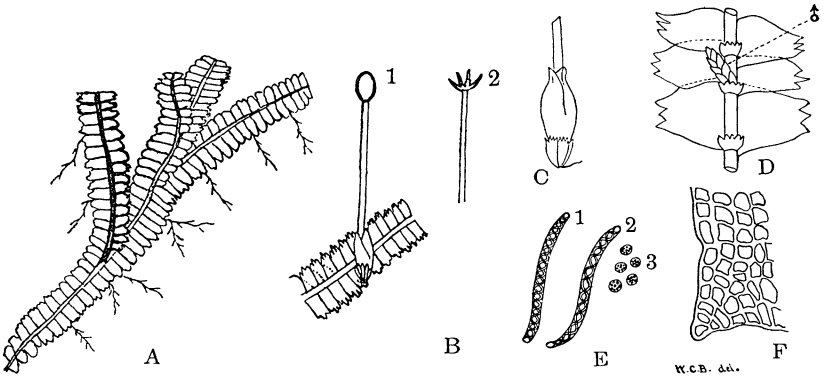
BAZZANIA.

By Wm. C. Barbour.

Though our first hepatics were of the distinctly thallose forms, and possessed nothing whatever which could be denominated "leaves," and though to follow a natural order, we would be confined to similar forms for some time to come, it has been thought wise, in the first few papers, to follow perhaps more the order in which the student would notice them.

Hence it is that we now leave the thallose forms like the Marchantia and the Conocephalum and consider one of the largest and most conspicuous of the "leafy" (foliose) forms—Bazzania trilobata S. F. Gray.



A, Plant slightly magnified. B, (1) Part of female plant with capsule. (2) Capsule open. C, Perianth and involucre. D, Leaves enlarged; underleaves; antheridial branch on male plant. E, (1. 2). Elaters. (3). Spores. F, Cells from leaf apex.

This species is very widely and commonly distributed through the eastern section of the United States and Europe. It occurs on moist hillsides and in wooded swamps and its appearance is so distinctive that, once it is recognized, it is impressed upon the student's memory and is at once known thereafter. The plants are frequently from two to three inches in length and branch dichotomously two or three times.

The leaves of most of the foliose hepatics are arranged so as to lie nearly flat in two ranks (complanate); but while in many mosses the leaves may be secund, in the hepatics this form is rare. In addition to these two rows of leaves there is typically a third row on the under side of the stem, known as amphigastra or "underleaves."

The underleaves alternate with the others, thus making a three-ranked spiral. In some genera the spiral turns from left to right, and the upper margin of each leaf is covered by the lower margin of the one next above. This method of overlapping is known as the *succubous* arrange-

ment of leaves. In some genera, however, the spiral turns from right to left, and thus the upper margin of one leaf is made to lie upon the lower margin of the one above, and the arrangement is then called *incubous*:—the leaves of Bazzania are incubous.

The plants when living are a dark green in color, becoming rather brownish green when they are dried. Slender flagellæ arise from the under side of the stem, and sometimes attain the length of three-fourths, or even one inch. They may be seen in the figure. These flagellæ are covered with minute scales and have tiny teeth at the apex. The main leaves are alternate and arranged closely in two rows. They are ovate in general outline, with a broad truncate apex, which is strongly three-toothed, whence the specific name—*trilobata*—is derived. There are but two genera common in the eastern United States which have incubous leaves.

The other genus (*Kantia*) has leaves which are entire (except in one rare species) and is light green in color. So that incubous dark green leaves, with toothed apex furnish marks for easily distinguishing this genus.

The leaves in *B. trilobata* are slightly deflexed or sometimes quite complanate. The only other species of our territory (*B. deflexa* Underw.) has its leaves strongly deflexed, with narrow apex, 2-3 toothed or rarely entire. This latter is found only in the higher mountains. Its underleaves are roundish-quadrangular, somewhat recurved from the stem, and have from four to six teeth. The surface of all leaves is somewhat shining.

Bazzania is a dioicous genus. The male organs (called antheridia, as in the mosses) are borne in the axils of leaves on short antheridial spikes, which in turn spring from the axils of underleaves. They are seldom found. The archegonia are borne on short branches, also from the axils of underleaves.

After the archegonium has been fertilized there is developed a nearly cylindrical sheath, white in color, and slightly three-keeled. This is the perianth. The perichaetial leaves are small ovate scales with the upper margin variously incised. The fertilized archegonium rapidly develops the sporogonium, with a rudimentary pedicel, and enclosed in a membranous sack, pointed at the apex and fastened at the base. This sack is the calyptra.

Soon the sporogonium bursts through the top of the calyptra, and passes on up through the perianth, borne upon a stalk of delicate white cellular tissue. It is now a shining, nearly globular body, dark brown in color. When it reaches a height of about a half inch above the perianth the capsule splits into four valves, allowing the dissemination of the spores. Contained in the capsule with the spores are elaters, with two slender spiral fibers, very like those previously described.

Sayre High School, Sayre, Pa.

So many of our readers are also interested in ferns that we feel justified in calling their attention to the latest and best book on the ferns, "Our Ferns in Their Haunts," by Willard N. Clute. Copiously illustrated with

colored plates, half-tones, and drawings that are both artistic and accurate, it is a delight to the eye. Containing all our species, described in a clear and interesting manner, it is a book that the amateur must have and the professional will have. The illustrated key is a feature novel and invaluable; the idea is so good that we hope to make use of it for the mosses. *A. J. G.*

NORTH AMERICAN THUIDIUMS.

By G. N. Best.

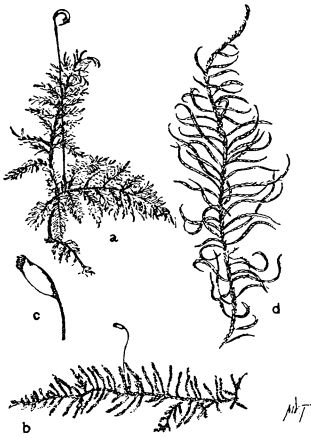


Fig. 1. a, *Thuidium delicatulum* x 1. b, *T. scitum* x 1. c, Capsule of the same x 5. *T. abietinum* x 1.

The Thuidiums are widely distributed and among the most common as well as the most beautiful of mosses. The stems of these plants are complanately branched, pinnate, bipinnate, rarely tripinnate. In most species the branches are so closely set as to give them a plumose appearance which is somewhat distinctive. Although multiform, the paraphyllia are more or less linear or filamentose, often divided and branched, but not foliose. The ovate-triangular stem leaves are usually papillose on both surfaces, unicostate, the costa passing the middle. The median leaf cells vary from roundish quadrate-hexagonal to rhombic-oblong; in two species linear-rhomboidal. The capsules, on smooth pedicels, are annulate, more or less curved. The opercula vary from conic to rostrate; the peristomes well developed; the endostomial band ⅓ the length of the teeth with segments and cilia.

SYNOPSIS OF SPECIES.*

*The species mentioned in Lesquereux & James' Manual of the Mosses of North America and here omitted, are as follows: Thuidium erectum is T. delicatulum; T. calyptratum is a form of T. microphyllum; T. Alleni is a dubious sterile form probably of T. delicatulum; T. remotifolium is not a Thuidium and T. tamariscinum is not known from North America.

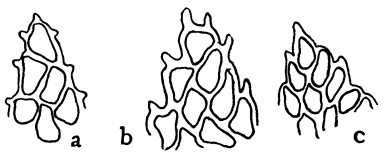


Fig. 2.

Apical cells of branch leaves crowned with 2-4 papillae (Fig. 2, a and b); median cells quadrate-hexagonal to oblong-rhomboidal (Fig 5).....A

Apical cells of branch leaves with a single terminal papilla (Fig. 2, c); median cells as in A. Paraphyllia numeros, branched.....B

Apical cells of branch leaves not papillose; median leaf cells linear-rhomoboidal (Fig. 10). Paraphyllia long linear or filamentose (Fig. 3, c)...C